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ABSTRACT

Definitions are provided for terms used by Swedish researchers and programers in the area of programed instruction. Some 60 definitions are given, many of them including references to additional information. (EMH)

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THE TERMINOLOGY OF PROGRAMMED
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A SELECTIVE LIST

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THE TERMINOLOGY OF PROGRAMMED INSTRUCTION:

A SELECTIVE LIST

Abstract. - Current terms within the area of programmed instruction are listed with brief definitions. Naturally, complete coverage is not aimed at. Instead, some attempt has been made to include key terms that have been used by Swedish programmers or researchers and/or that together form a relatively consistent frame of reference.

Adaptive instructional system An instructional system which can adjust itself to varying student behavior, for example, by giving simpler tasks if the student has not been successful, and more difficult tasks ~~when~~ the student is successful.

Algorithm General and non-ambiguous prescription for solving problems within a specific problem area. Part of the subject-matter analysis (as one step in the pre-writing phase when constructing self-instructional study materials) may be focused upon the questions: to what extent is it possible to formulate algorithms for the subject-area involved, and to what extent can and should these influence the instructional sequence and method?

Amplified T-tabulation A "T-tabulation" (see that term) to which, besides the usual data from the goal analysis, have been added a list of items of information about the target population with point of departure from the student analysis. Reports on the special preliminary knowledge and existing skills of the students have then been added as well as possibly a judgment as to how the ordinary occupation of the students after their specific educational training can affect the results of the instructional program in the long run. An influence of this kind can naturally be both a support and a hindrance; hence, an appraisalment in this respect can modify the programmer's treatment of the question of repetition and overlearning. (For illustration, see Bierstedt, 1963, p. 62)

Anschütz diagram A diagrammatic method (developed by H. Anschütz) for the evaluation and comparison of instructional programs, utilizing an examination of the distribution of concepts over the instructional micro-units. (For details, see Anschütz, 1965.)

Branching model A course layout which makes it possible for different categories of students (for example, students with different preparatory knowledge) to take separate paths through the study material.

C-catalog A collection of fundamental concepts (C) in a certain subject area. Systematizing these logical "basic units" within a hierarchical system results in a "structured C-catalog". (A card file with the separate units on separate cards is often a practical set-up for such a catalog.)

C. C-catalog (or "CxC-catalog") A collection of instructionally interesting relationships between the logical "basic units" (C) within a certain subject area. A catalog of this type (which in concrete form ordinarily is set up as a card file) can be made up with the help of a "C-matrix" (see that word).

Chain model ("conversational chaining") A course layout in which the individual didules are linked together in such a way that the feedback component of the preceding instructional unit is incorporated as a part of the stimulus component of the following unit. In other words, the key answer is not given a separate presentation, but is embedded as part of the next unit, ordinarily as one or more words printed in italics (cf. "Didule").

C-matrix An aid in mapping the instructionally interesting relationships between various fundamental concepts within a certain subject area. In principle it consists of a square-ruled diagram, the row and column headings of which are the key words for the various "basic units" in the C-catalog, and every cell in the matrix is thought to symbolize all possible relationships between two such units. The constructor can, for example, go through the matrix cell by cell and ask himself questions of this type: What connection is there between these two concepts, and is this connection such that it can and should be used pedagogically? (For illustration, see Bjerstedt, 1963, p. 78 f.)

Correlative stimuli Information, instructions and evaluations, which in an instructional situation are presented in close connection with the principal points of the content but are not themselves meant to be learned. When these correlative stimuli have the chief function of facilitating the learning of certain other items, they can be called "prompts". (Compare "Focal informative stimuli".)

Corrule See "Didule".

Crowder model A course layout which combines a branched flow-model (in which the student's working path is successively determined by his accomplishments) with use of multiple-choice responses. The model has been realized partly in book form (see the term "Scrambled book"), partly in the form of mechanical presentation (e. g. Auto-Tutor, Mark II). Crowder's most frequent use of the branching technique seems to be for explanation of an error just made.

Density of information A measure of the effective communication of information ("reduction of uncertainty" for the student; compare this word) in relation to some quantitative characteristic of the study material, e. g., the number of instructional units. For example, the fewer "didules" (see that word!) which are used to present a certain amount of information to the student, the greater the density of information can be said to be.

Didactogram A diagram (used during the empirical testing of instructional programs) showing one or several students' progress through a programmed study material. As background pattern for the didactogram the previously worked out "didactoplan" may sometimes be used (see word "Didactoplan"), after the necessary revisions and specifications have been incorporated. On such a pattern (showing the basic structure of the study material) are presented the behavior data: in part, information as to the study routes used; in part, information as to right and wrong performances. (For illustrations, see Bjerstedt, 1965, p. 103-104.)

Didactoplan A graphic visualization (mainly made use of during the pre-writing phase) of the internal order in which one plans to bring up different subject-matter units (e. g., concepts) in the auto-instructional study material. By the use of special symbols, it can be shown on the chart which points in the material will be gone through by all, and which will be presented only to certain students.

Didule The fundamental instructional unit in programmed study material, ordinarily consisting of three components: the "stimule" (the information component), the "respule" (the response request), and the "coi rule" (the feedback component). The didule can be said to represent the contribution of the program to the fundamental unit of interaction between

the pupil and the program, which ordinarily has the temporal sequence: s-r-R-c. (The letters s, r and c refer to the three components mentioned above; capital R symbolizes the student's answer reaction or "response"). - The didule is an instructional unit in programmed study material, that is, it is not identical with a presentation unit. (The most nearly equivalent term "frame" has the disadvantage of being used both for the concept 'instructional unit' and for the concept 'presentation unit'.)

Didule protocol An aid in the examination of an instructional program.

The protocol consists of a chart in which each separate didule has a matching review column and the different review points are entered as row headings. (For illustrations, see Bjerstedt, 1966, p. 21-25.)

Egrul See "Ruleg".

Fading Successive diminishing of the number of elements in a stimulus complex. In programmed teaching the term is used in two contexts. (1) = Successive cutting down of prompts (so that the student gradually can give a correct answer without help, while he was able to give the correct answer in the beginning only with the help of certain clues; "fading of correlative stimuli"). -- (2) = Successive disconnecting of separate parts of a larger stimulus complex, which is meant to be learned as a whole ("fading of focal stimuli"). Example: The student learns a poem by repeated recitations. As a support for his memory he has a text for use in recital, which successively is cut down as words and sentences are deleted. -- For meaning (2) the term "vanishing" is sometimes used.

Feedback technique The interplay between the student and the study material, which tells the student to which extent he has succeeded with each separate task. Ordinarily the feedback takes the form of a key answer presentation, but simple information as to whether the student response was right or wrong, or more detailed error explanations occur in some arrangements. It is typical of the programmed instruction that feedback is almost immediate and very frequent.

Filter didule A unit in the study material which informs us as to the best possible working track (branch) for the individual pupil. Depending on what the more specific purpose is, we can speak of "pre-controlling" or "post-controlling" didules (see these words).

Focal informative stimuli The main points in the content which in an instructional situation are presented to a student to be "learned" (compare "Correlative stimuli").

Formal prompts Stimuli, which provide knowledge about the form of the expected response and thereby make it easier for the student to give the correct answer. The student can, for example, be allowed to see the first letter of the correct answer word or to know how many letters are in the word. (Since overuse of this type of clue technique can promote thoughtless answering with an inadequate direction of attention, it should as a rule be used sparingly.)

Goal analysis Analysis of instructional objectives. A careful and detailed review of which knowledges and skills the students should be able to display after going through a certain study material. (Compare "Terminal behavior repertoire".)

Horizontal panel-book A programmed textbook in which the pages are divided into panels which are not read in the usual reading sequence (from top to bottom) but from page to page (or from sheet to sheet). The student reads, in other words, the top part of the pages through the whole book (or a large part of the book) before he goes over to another section of the same pages. The key answer for a given task does not usually appear in the same section or on the same page, but separately on the back of the section or in connection with the next information unit.

Instructional effectivity Some measure of the instructional result in relation partly to a specific goal, partly to instructional time expended. An effective instructional situation is, therefore, a situation in which an optimal balancing of behavioral products (as defined by the goal analysis) is achieved with the minimum expenditure of time.

Integrator A teaching aid which offers the student a continuously alternating sequence of (a) presentation of material and (b) the possibility of response reaction. Programmed textbooks and teaching machines are typical examples. An integrator, through this double function, is different from the much more usual aids in conventional teaching, which either have just the function of "presenting" or only give the student an opportunity for a response reaction. The term "presentator" describes an aid in teaching, the chief task of which is to present to the student a stimulus-sequence prepared in advance

(an ordinary textbook or educational film would be typical examples). The term "reactor", on the other hand, refers to a teaching aid, the chief function of which is to offer the student opportunities to give response reactions. (Example: Question lists.)

Intermittent model A layout of the auto-instructional material which demands a fairly independent treatment of the material by the student. He is presented with a "guide book" containing a detailed study plan and self-correcting part tests, but the main material is collected by the student from different sources outside the guide-book. If the result of a test is good, the student is directed to new material. If it is not good, he is sent back to the same source (or one parallel to it). This shifting between instructions, independent study, and diagnostic review tests places the intermittent model somewhere between a completely programmed course and Pressey's "tail model" (see that word).

Iteration model A course layout in which the student always goes through the various instructional micro-units in a pre-established order, the same for all students, but where he is directed to repeat single units (or groups of units) under certain achievement conditions.

Linear model A course layout with the same task sequence for all pupils.

Micro-branching model A "branching model" in which a certain student differentiation may take place within the separate instructional unit (e.g., different error explanation), while these units as a whole are taken in the same order by all pupils. Most scrambled books, for instance, are of this type. (See "Branching model" and "Scrambled books".)

Multiple success strategy An attempt to create a dual motivation (possibly for different categories of students simultaneously). This can mean, for example, that on the one hand the student works through the study material with a high probability of getting the correct answer to separate tasks ("sure winner"), while on the other hand he is offered "extra success possibilities" (for example, possibilities for fast-track procedure and/or the satisfaction of answering correctly without clues, "individualized clue feeding").

Parallel track arrangement A branching model (see that word) which allows two or more separate categories of students to go through differently designed study plans with the same final goal. The same principle or group of problems can, for example, be treated from various points of

view, depending on the varying preliminary attitudes of the different students.

Passage criterion The lowest possible point which the student can be allowed to reach with reference to a certain terminal behavior. In goal analysis it is important to fix specific values of this kind, as soon as we are dealing with a continuum of skill within a certain area of behavior. Without a clearly defined "minimum for acceptability" it is impossible to judge how well the goal set by the course has been reached. The passage criteria can suitably be included in the "T-tabulations". (Compare "Goal analysis", "Terminal behavior", and "T-tabulation".)

Post-controlling didule A unit in the study material with which an effort is made to examine whether the student has learned carefully enough what has just been studied. If his responses should show that this is not the case, the student is directed back to a section which has already been gone through or to an alternative repeat section (with similar, although not identical content).

Pre-controlling didule A unit in the study material with which an attempt is made to determine whether the student has sufficient preparatory knowledge to be able to skip a certain section of the course.

Presentator See "Integrator".

Programming Construction of auto-instructional study material according to a three-phase procedure consisting of (a) preparatory work ("pre-writing" phase) with, among other things, emphasis on goal analysis and subject-matter analysis, (b) composition of a preliminary version utilizing certain psychological principles of learning and (c) a "post-writing phase", including successive empirical try-outs and revisions in the preliminary versions until the goal determined in advance has been reached.

Reactor See "Integrator".

Reduction of uncertainty A measure of the average effectivity of an instructional material, expressed as a reduction of the number of errors (within a certain specific student group). If we examine the ability of the students to solve a related terminal test item before going through the material ("error percentage A"), as well as their ability to solve the problem after going through the material ("error percentage B"), then the measure

of reduction of uncertainty would be "error percentage A - error percentage B". (Compare terms "Speed of information" and "Density of information".)

Response request That part of an instructional micro-unit which presents the student with the task of giving an active response reaction (to solve a problem in mathematics, to fill in a word which has been left blank, choose the right alternative from several which have been presented, etc.). It is typical of the programmed instruction that these response requests are very frequent and continually alternate with the presentation of new material.

Respule See "Didule".

Reverse accumulation A system for practising a temporal behavior sequence as follows: the final phase of the series is practised first, after this the next to the last plus the last, etc. Besides the fact that the student practises sequences (instead of separate phases only), the advantage of this arrangement is that the student experiences a motivation in being able, at an early stage, to perform the final phase in a behavior series. This is especially true if this final phase has the character of a desirable goal.

Ruleg (1) A sequence in programmed study material in which a new information is introduced according to the formula: first general rule (law, principle, definition or the like), then a complete example, then an incomplete example for the student to work with. That is, the "ru" (rule) precedes the "eg's" (examples). (2) The term is also used (and originally) for a special system of constructing self-instructional study material, developed by Evans, Homme, and Glaser (1962), in which the use of the sequence type mentioned above is an important part, but that also has a series of other typical characteristics. - The term "Egrul" is sometimes used for the more inductive sequence (leading the student through some examples before letting him try to formulate the rule himself); hence, the opposite of Ruleg (1).

Scrambled book A programmed textbook characterized by branches incorporated for the purpose of explaining errors. After going through the first information unit, the student must answer a multiple-choice question as control. The answer he chooses determines the page to which he is directed next. If he has chosen the right answer, the new page presents

new information and a new task. If his choice has been wrong, on the other hand, he is given an explanation of his error on the new page and as a rule is directed back to the original task page with the order to choose a better answer.

Skinner model A course layout which combines a non-branching flow model (linear model where all students go through the same study material in the same order) with a demand for self-constructed responses. The name derives from B.F. Skinner but is somewhat misleading, since Skinner worked with other models also (among them models with extreme individualization of the repetition procedure).

Speed of information A measure of the effective communication of information ("reduction of uncertainty" for the student; compare this word) in relation to the period of time needed for learning. A measure which indicates, in other words, how much effective information the students assimilate per time unit in going through a certain instructional program, and which thereby gives us one meaningful point of departure in evaluating the effectivity of the program.

Spiral progression A sequence of material set up in such a way that the student goes through different subject-matter areas at a lower grade of difficulty before going on to these different areas of material at a higher level of difficulty.

Stimule See "Didule".

Student-paced flow of information The fact that in programmed instruction most often the student himself decides when a new information unit shall be presented to him (as opposed to lesson and lecture teaching where the flow of information is directed by the teacher).

Surplus learning An extra dividend in the learning result, over and above the specific knowledges and skills. Acquired study techniques, attitudes to a certain field of knowledge and the like may be considered "surplus learning".

"Tail model" A layout of auto-instructional material which presupposes that the student has already in some other way acquired the main points of the study material (for instance, in an ordinary textbook). The auto-instructional material functions then as a post-study control and remedial teaching where needed. The foremost advocate of this partial type of auto-instruction is S. L. Pressey.

Target population That group of students to which a certain study material is directed.

Terminal behavior or terminal behavior repertoire The knowledge and skill which the student should be able to display after going through a certain study material. A careful mapping of the desired terminal behavior is an important part of the preliminary work in drawing up a programmed course. (Compare "Goal analysis".)

Terminal test An examination with the help of which it is possible to ascertain whether a student who has gone through a given study material can demonstrate the knowledge and skill which are specified in the goal description of the course. (Also: "criterion test".)

Thematic prompts Stimuli which with the help of meaningful (content-related) associations make it easier for the student to give the correct answer. Examples and logical deductions can be counted as belonging to this group of hints.

T-tabulation A tabulation (used as an aid in goal analysis), with the help of which the programmer gets a survey of (a) the specific "terminal behaviors" (see that word) which the student should display at the end of the course as well as (b) under which detailed conditions this shall take place. The T-tabulation consists of a cross-classification chart of specific terminal behaviors on the one side and a list of "specifications" (which describe approved aids, acceptable minimum speed, maximum tolerance of error etc.) on the other. (For illustration, see Bjerstedt, 1963, p. 55.)

Tutofor A general term for an aid in presenting a teaching program to a student. This aid, or tool, can take the form of a printed book, which we then refer to as a "programmed textbook" (or "tutoprint"). But it can also be of mechanical character, and we then speak of a "teaching machine" (or "tutomat").

Vertical panel-book A programmed textbook, in which the pages are divided into panels which (in contrast to the case of the "horizontal panel-book", compare that word) are read in the usual reading sequence (from top to bottom of the page). Each panel usually contains a short information unit to which is linked a response request. A key answer is also usually part of the instructional micro-unit, and this can be placed in the same panel

("simple marginal-key"), in connection with a later panel ("delayed marginal-key"), or also on the back of the information page.

Weltner technique A technique for assessment of the instructional effect of a particular program, utilizing the difference in subjective information of a basic text before and after the instruction. The difference is established by means of a specific technique of text predictions, similar to one introduced by C.E. Shannon. (For details, see Weltner, 1966.)

Zig-zag book A programmed textbook in which the pages are divided into cut sections which can be turned forward and backward independently of each other. This provides a better stimulus situation than that offered by the ordinary forms of horizontal and vertical panel-books. That is, the key answer is not in the visual field when the student answers the problem, but both the problem and the key answer are in the visual field after the student has answered. (For illustration, see Bjerstedt, 1963, p. 113.)

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